Exhibit T

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

CISCO SYSTEMS, INC. and OCLARO, INC.,
Petitioners,

v.

OYSTER OPTICS, LLC,
Patent Owner.

Case IPR2017-01881
Patent 8,913,898 B2

DECLARATION OF KEITH W. GOOSSEN, Ph.D., IN SUPPORT OF PATENT OWNER'S RESPONSE

TABLE OF CONTENTS

I, Keith W. Goossen, hereby declare as follows:

I. INTRODUCTION

1. I have been retained as an expert on behalf of Oyster Optics, LLC ("Oyster") for the above-captioned *Inter Partes* Review ("IPR") involving U.S. Patent No. 8,913,898 (the "'898 patent").

2. I am being compensated for my time in connection with this IPR at my standard consulting rate of $350 per hour for consulting service and $100 per hour for any necessary travel time. My compensation is not dependent on the outcome of this proceeding, the results of my analysis, or on the substance of my opinions and testimony.

3. I have been asked to provide my opinion on the validity of the '898 patent. In particular, I have been asked to consider whether the Petition ("Pet.") filed by Cisco Systems, Inc. and Oclaro, Inc. (collectively, "Petitioners") has established: (i) whether each of claims 14-15, 20-22, and 24 of the '898 patent is unpatentable over Corke[1] and Ade,[2] (ii) whether claim 16 is unpatentable over Corke, Ade, and Ikeda,[3] (iii) whether claims 17 and 18 are unpatentable over

[1] Ex. 1005, U.S. Patent No. 5,510,917 to Corke ("Corke")

[2] Ex. 1024, U.S. Patent No. 5,347,601 to Ade et al. ("Ade")

[3] Ex. 1033, U.S. Patent No. 7,016,612 to Ikeda et al. ("Ikeda")

Corke, Ade, and Hooijmans,[4] and (iv) whether claim 19 is unpatentable over Corke, Ade, and Kobayashi. I have also provided opinions on other matters as set forth in this Declaration.

4. In preparing this Declaration, I have reviewed the following materials:

Description	**Paper or Exhibit No.**
Petition for *Inter Partes* Review of U.S. Patent No. 8,913,898 (dated July 27, 2017)	Paper 1
Decision: Institution of *Inter Partes* Review 37 C.F.R. § 42.108 (dated Feb. 27, 2018)	Paper 11
U.S. Patent No. 8,913,898 (the "'898 Patent")	1002
Declaration of Dr. Daniel Blumenthal	1003
U.S. Patent No. 5,510,917 ("Corke")	1005
U.S. Patent No. 5,347,601 to Ade *et al.* ("Ade")	1024

II. BACKGROUND AND QUALIFICATIONS

5. I have 30 years of experience in the field of optical communication systems and components for such systems, including direct experience in the early development of fiber optic Wavelength Division Multiplexing components and Optoelectronic Integrated Circuit chips. A brief summary of my background and

[4] Ex. 1008, Coherent Optical System Design by Pieter W. Hooijmans ("Hooijmans")

qualifications is provided in this section. My *curriculum vitae*, Exhibit 2025, provides additional details regarding my background and qualifications.

6. I became an Associate Professor in Electrical and Computer Engineering at the University of Delaware in 2002 and was recently promoted to Professor. I oversee the Optoelectronic Packaging and Integration laboratory at the University of Delaware, which researches advances in optical computing and communication, optical sensors, photovoltaics, and other photonic technologies. I am also the Director of the Mid-Atlantic Industrial Assessment Center, an award-winning center for research and development of energy systems and energy efficiency. The Center has won the 2012 U.S. Department of Energy Best Center award, and the 2015 U.S. Department of Energy Excellence in Applied Energy Engineering Research award.

7. I have served on professional committees including the IEEE Conference on Micro Electro Mechanical Systems and IEEE Optical Interconnect conferences. I am a Senior Member of the Institute of Electrical and Electronic Engineers (IEEE).

8. I earned a B.S. in Electrical Engineering from the University of California at Santa Barbara (1983) and an M.A. in Electrical Engineering from Princeton University (1985). I received my Ph.D. from Princeton University in 1988, and worked at Bell Labs from 1988 until founding Aralight, Inc. in

September, 2000. I performed research at Bell Labs in MEMS-based (Micro-Electro-Mechanical Systems-based) optical switches, much of which forms the basis of today's wavelength selective switches.

9. In September of 2000, I co-founded Aralight, Inc, where I was involved in the company's raising of $10 million in capital and the growth of the company to 35 people. The company's product, an integrated optoelectronic fiber-optic transmit/receive module—showing 3x the bandwidth of previous such products—was based upon my inventions and followed on my research at Bell Labs. Aralight's product was demonstrated at the 2002 Optical Fiber Communication conference, at which time I entered academia. Aralight was later sold and its product forms the basis of today's Active Optical Cabling, which enables high-speed optical backplanes for switches and supercomputers.

10. I am the inventor (or co-inventor) on 87 issued U.S. patents. The technology of my patents covers optoelectronic devices and integration, optical systems, MEMS, and electro-optics. I have over 300 published papers and conference proceedings.

III. UNDERSTANDING OF PATENT LAW

11. In forming the opinions expressed in this Declaration, I relied upon my education and experience in the relevant field of the art, and I have considered the viewpoint of a person having ordinary skill in the relevant art at the time of the

invention. I am not a patent attorney, nor have I independently researched the law of patent validity. Attorneys have explained certain legal principles to me that I have relied on in forming my opinions as set forth in my Declaration, including principles of prior art, anticipation, and obviousness.

12. I have been advised, and it is my understanding, that patent claims in the IPR are given their broadest reasonable interpretation in view of the patent specification, file history, and the understanding of one having ordinary skill in the relevant art at the time of the invention.

13. I understand that in an *inter partes* review, the petitioner carries the burden of proving patent claim invalidity by a preponderance of the evidence on a claim-by-claim basis, based on either patents or printed publications. Each claim is analyzed independently. It is my understanding that when a party has the burden of proving a claim invalid by the preponderance of the evidence, the party must show that it is more likely than not that the claim is invalid.

14. I understand that a patent can be invalid for anticipation or for obviousness.

15. I understand that a patent claim may be invalidated as anticipated under § 102 of the patent statutes only if a single prior art reference discloses each and every limitation of the invention. To render a claim anticipated, the single reference must disclose each and every limitation of the claim either expressly or

inherently, and must disclose every limitation of the claim as those limitations are arranged in the claim.

16. I understand that a limitation inherently exists in a reference only if that limitation is necessarily disclosed by the reference. The mere fact that something may result from a given set of circumstances is not sufficient to show inherency, as inherency cannot be established by probabilities or possibilities.

17. I understand that under § 103 of the patent statutes, a patent claim may be invalid as obvious in view of a combination of prior art references or in view of a single prior art reference. Obviousness is determined from the perspective of a hypothetical person of ordinary skill in the art (also known as a "POSITA" as discussed below in ¶23).

18. I understand that an obviousness analysis involves three factual inquiries: (1) the scope and content of the prior art, (2) differences between the prior art and the claims at issue, and (3) the level of ordinary skill in the art.

19. I understand that a patent claim may not be obvious if the prior art, either alone or in combination, and even when combined with the knowledge of one having ordinary skill in the art, does not disclose or suggest all of the limitations of a claim, *i.e.* that there remain differences between the prior art and the claim at issue. I also understand that a patent claim may not be obvious if a

POSITA would not have modified or combined the prior art in a manner that would have disclosed or suggested all of the limitations of the claim.

20. In addition, I understand that a variety of factors are considered in determining whether an invention would have been obvious to a person of ordinary skill in the art. For example, a teaching, suggestion, or motivation in the prior art that would have led a person of ordinary skill in the art to modify a prior art reference or select multiple prior art references and combine them in such a fashion as in the claimed invention, may render an invention obvious. As well, a combination of elements that was obvious to try, for example, in light of market pressures, may render an invention obvious if there was a reasonable expectation of success. I understand that other factors can be considered in an obviousness analysis, including:

a. whether known elements are combined using known methods to create predictable results;

b. whether one known element is substituted for another known element to obtain predictable results;

c. whether a known technique is used to improve a similar device in the same way;

d. whether a known technique is applied to a known device ready for improvement to yield predictable results; and

e. whether design incentives or other market forces would have prompted a POSITA to implement predictable variations in known work in one field of endeavor for use of those predictable variations in either the same field or a different one.

21. I understand that an invention may not be obvious if the prior art reference(s) teaches away from the proposed modification or combination of prior art references. In addition, an invention may not obvious if the proposed combination creates "unpredictable results." Also, an invention may not obvious if the proposed modification or combination would render the prior art device inoperable.

22. I further understand that a patent composed of several elements is not proved obvious merely by demonstrating that each of its elements was independently known in the prior art.

IV. PERSON OF ORDINARY SKILL IN THE ART

23. I understand that the factors considered in determining the level of ordinary skill in the art include education and experience of persons working in the

art, and the types of problems encountered in the art. Based on these factors, in my opinion, a person of ordinary skill in the relevant art of the '898 patent in the 2001-2002 timeframe has at least a bachelor's degree or equivalent in electrical engineering with optical engineering coursework, and five or more years of experience in optical transmission systems and associated components. I have been informed that this hypothetical person can be referred to as a "POSITA." For example, a POSITA would have education and/or experience sufficient to understand optical components for encoding, transmission, and decoding of data and related standards and concepts. My opinions contained in this declaration are given from the perspective of a person of ordinary skill in the art at the time of the July 9, 2001, the filing date of U.S. provisional patent application No. 60/303,932, and also as of July 3, 2002, the filing date of U.S. patent application 10/188,643, even if an opinion is expressed in the present tense. I perceive no relevant change in the level of ordinary skill for this date between these dates.

24. As of the 2001-2002 timeframe, I satisfied this definition of a POSITA.

25. In preparing this declaration, I reviewed Dr. Blumenthal's declaration, Ex. 1003. He states that "a person of ordinary skill in the art for the '898 and '327 Patents in the years 2000-2001 would be a person having a B.S. in Electrical Engineering or a related field with at least five years of experience in designing

optical transmission systems, or having an M.S. in Electrical Engineering or a related field." I disagree slightly with this statement. An M.S. in Electrical Engineering can be completed without taking any optical transmission systems courses. In order to qualify as a person of ordinary skill in the art, a person having fewer than five years of experience in designing optical transmission systems would need to have taken extensive coursework in optical transmission systems while completing the M.S. program in Electrical Engineering.

V. CLAIM CONSTRUCTION

26. I have generally given all the claim terms of their plain and ordinary meaning as it would be understood by a person of ordinary skill in the art at the time of the invention, giving consideration to the context provided by the patent specification. I have also considered the analysis and constructions set forth on pages 11-14 of the Board's Institution Decision, and I have treated the terms "a transceiver card," "a first optical fiber," and "a second optical fiber" in the preamble of claim 14 of the '898 patent as limiting according to the Board's Institution Decision.

VI. ANALYSIS

27. It is my opinion that Petitioners have not established unpatentability of claim 14 over Corke and Ade. In particular, I believe a POSITA would not have modified Corke to provide "a first optical fiber" and "a second optical fiber" as set

forth in the combination of elements recited in claim 14. Additionally, Corke does not disclose an energy level detector having a "threshold indicating a drop in amplitude" of an optical signal, as set forth in claim 14, and a POSITA would not have modified the proposed combination of Corke and Ade to include that feature.

Corke's Bidirectional Fiber Embodiments

28. Corke's embodiments showing bidirectional transmission and reception of optical communications, i.e., those embodiments showing a transmitter port and a receiver port at a common node (including Fig. 4 and Fig. 7) disclose the use of a single "primary" fiber operating bidirectionally and a single "secondary" fiber, which can also operate bidirectionally. This means that optical signals can be transmitted in both directions on the bidirectional optical fiber. I will refer to each of these single, bidirectional fibers of Corke as a "bidirectional fiber."

29. Prior to the 2001-2002 timeframe, bidirectional optical fiber links were being explored primarily for cable TV and fiber-to-the-home. For this technology to be commercially feasible, costs must be kept as low as possible. Bidirectional optical fiber links are less expensive because they require fewer components than multiple unidirectional optical fiber links in which optical signals are transmitted in only a single direction on a fiber.

30. Corke's bidirectional fiber embodiments rely on detection of the signals ***received*** by a node of a communications link to determine which fiber, or route, is used by that node to ***transmit*** signals. For example, Corke's Abstract states "In bi-directional communication systems, performance of a wave length moving in one direction through a route determines route quality for transmission in the other direction, as well." Corke, Abstract. Corke discloses similar use of the received signal performance to determine the route or fiber quality, and therefore selection of a transmission route based on the received signal performance, at various spots in the specification and claims, including at 3:1-6, 3:19-30, 4:50-62, 9:8-14, and 12:19-26.

31. Accordingly, when a primary bidirectional fiber is damaged or severed, a node in Corke's system decides to switch to a secondary route for transmission and reception of optical signals based on the quality of received signals. Corke, 1:11-17, 5:42-44.

32. This feature of using signals received by a node to control how signals are transmitted by the node is reflected in preferred embodiments of Corke. With regard to Fig. 7, Corke notes, "If the route A cable is disturbed or severed, the 1550 nm monitor system detects that condition and automatically switches to route B. The 1330 nm signal ***travelling in the opposite direction*** is also directed on to the route B cable." Corke, 9:11-14. Similarly, Corke states regarding Fig. 8, "In this

embodiment if route A should fail it would be detected by the detector 44, which is monitoring the signals from the transmitter 30. The control device would make the digital comparison, as described above, and upon determining the intensity at the detector has fallen below the specified digital threshold value it would switch the switch to access route B, (assuming that route B monitored status was acceptable). The signal from the ***transmitter 130*** would then ***automatically be diverted*** through route B to the receiver 151, while the signal from transmitter 30 is received at receiver 50 through route B." Corke, 9:33-45.

33. Corke also teaches monitoring the performance of the fiber on a wavelength-by-wavelength basis to sense wavelength-specific performance degradation. Corke, 8:31-49. Corke specifically teaches that "monitoring the combined optical power (at 1300 and 1550 nm) by a single detector can lead to serious signal failure at one wave length, leading to poor BER [bit error rate] performance being undetected." Corke, 8:31-35. To overcome this problem, Corke teaches monitoring the performance of each wavelength individually by separating the combined signal and then detecting the intensity of the signal at each wavelength, 1300 nm and 1550 nm. Corke, 6:22-40; Fig. 2, Fig. 4.

34. Thus, a POSITA would also understand Corke's teaching to monitor the performance of each wavelength individually by separating the combined received signal and then detecting the intensity of the signal at each wavelength,

1300 nm and 1550 nm. Based on that wavelength specific performance, Corke determines which route to select for transmission of optical signals. Corke refers to this scheme as "independent monitoring of each wave length in both routes A and B." Corke, 8:51-52.

35. As an example of how this teaching improves over the prior art, Corke explains that a complete loss of the 1550 nm signal on route A could reduce the combined optical power level by 50%, and that this reduction "would not, under typical operations conditions of a digital data transmissions link, cause the route A monitoring system to switch or alert the switch control system." Corke, 8:42-49.

36. Corke's method of deciding which transmission fiber to use necessarily requires bidirectional fibers. In Corke's system, the decision to select a transmission fiber occurs entirely at a node originating a transmission. That decision is based only on information in that node, specifically including a measurement of the average intensity of optical signals received by that node. A POSITA would understand that Corke could not use a measurement of the average intensity of received optical signals to make a decision of regarding the wavelength-dependent quality of the transmission fiber unless the characteristics of the received signals were linked to the characteristics of the transmission fiber. A bidirectional fiber physically links those wavelength-dependent characteristics, and, thereby provides a direct indication of the wavelength-dependent quality of

the transmission fiber. A POSITA would not regard a system having unidirectional fibers to have a sufficient link to allow a measurement of a received signal to be used in a decision to determine the quality of a transmission fiber, including for wavelength-dependent properties. Unlike Corke, in such a system, there would be no direct monitoring by the transmitting node of any characteristic of the unidirectional transmission fiber at all. Accordingly, use of bidirectional fibers in Corke's bidirectional communication embodiments is necessary.

37. Accordingly, a POSITA would understand that Corke's system embodiments showing a transmitter port and receiver port at a common node require bidirectional fibers since Corke's goal is to determine if a fiber is acceptable for transmission, and it achieves this goal by monitoring the received signals from the fiber, evaluating the intensity of these received signals, and making a determination whether the fiber is acceptable for transmission of signals. Thus, Corke's system requires reception and transmission along the same bidirectional fiber.

38. Given Corke's teaching, a POSITA ***would not*** have replaced Corke's single bidirectional fiber of Route A with two unidirectional fibers, and would not have replaced Corke's single bidirectional fiber of Route B with two unidirectional fibers. As I already explained above, this substitution would have increased the cost of Corke's system, and this would have been undesirable to a POSITA.

39. Additionally, this substitution of elements would have eliminated the ability of a node in Corke to determine if a route's fiber is compromised by monitoring received signals received over that same fiber. Corke teaches to monitor the performance of each wavelength individually by demultiplexing the combined received signal and then detecting the intensity of the signal at each wavelength, 1300 nm and 1550 nm. Corke explains that this process of independent monitoring allows for improved detection of a signal failure at one wavelength over combined signal monitoring. The substitution of two unidirectional fibers for each one of Corke's bidirectional fibers would cause Corke's control unit 10 to select a route for signal transmission without any data indicating whether the unidirectional transmission fiber was experiencing signal loss. This modification directly contradicts Corke's teaching of selecting a route for transmission based on more data rather than less (or none at all). This modification eliminates Corke's ability to select a fiber for transmission with a significantly reduced risk of signal degradation or performance loss.

40. I understand that Petitioners propose to modify Corke based on Ade's use of separate optical fibers for transmission and reception of optical signals. Pet., 20. Petitioners rely on Ade's separate-fiber embodiment for this change, described at 16:24-34:

> Further, it should be understood that the coupler need not be used. In that case, the transmit light would exit from the port 46 and the receive light would enter at the port 54. Also, the waveguides 32,94,44 would provide a conduit for the light 30 to exit the transceiver and the waveguides 52,96,70 would provide a separate conduit for the light 90 to enter the transceiver. In that case, a separate fiber would be used for transmit and receive light, i.e., there is not a single bidirectional communication line to the chip.

41. Petitioners and Dr. Blumenthal fail to explain why a POSITA would have relied on Ade's mention of the use of separate transmit and receive fibers to modify Corke's system. They state no benefit that Corke would gain from using separate transmit/receive fibers. *See* Pet., 20, 35; Ex. 1003, ¶¶61, 155.

42. Transceiver chips as shown in Ade can be designed for either bidirectional fiber for both transmission and reception, or unidirectional fibers, with one unidirectional fiber for reception and another unidirectional fiber for transmission. However, Corke's system relies upon bidirectional fiber to function. A POSITA working on Corke's system would find the statement in Ade that unidirectional fibers can be used for Ade's transceiver chip to be irrelevant to

Corke and contradictory to Corke's teaching of selecting a route for transmission based on the fiber's performance, as determined by the intensity of the signal received from the same fiber, measured at each wavelength.

43. A POSITA would understand that Corke's use of bidirectional fibers, coupled with Corke's use of the received signal performance measurements to determine a transmission route, provides benefits over the use of separate transmit and receive fibers. Corke's interaction between its receive and transmit functions allows it to provide monitoring of the same fiber used for reception and transmission. Thus, a POSITA would understand that Corke's use of bidirectional fibers increases the likelihood that Corke is able to transmit over a fiber that will not fail or otherwise degrade the transmission.

44. Corke's reliable transmission safeguard is lost in Petitioners' modification. A POSITA would understand Dr. Blumenthal's proposal to isolate reception and transmission in the proposed combination of Corke and Ade. By isolating the sub-systems, nothing in the proposed combination is provided to monitor the transmission fiber, either as a whole or for wavelength-dependent degradation. In fact, Dr. Blumenthal proposes a combination of Corke and Ade where the transmitter and receiver have "no synergy (or interaction) between the transmitter and receiver." Ex. 1003, ¶83.

45. Accordingly, a POSITA would not have been motivated to modify Corke in view of Ade's embodiment having separate transmit and receive fibers because this would have eliminated Corke's ability to determine if a fiber used for transmission is compromised by monitoring received signals over that fiber.

46. Petitioners and Dr. Blumenthal also failed to appreciate that a combination of Corke and Ade would have still resulted in the use of a single bidirectional fiber on each route (rather than separate receive and transmit fibers). In a system that used Ade's chip with two unidirectional fibers, Ade's first unidirectional fiber output would have interacted with transmit (Tx) port 26 of Corke's Fig. 4, and Ade's second unidirectional fiber would have interacted with Corke's receive (Rx) port 27:

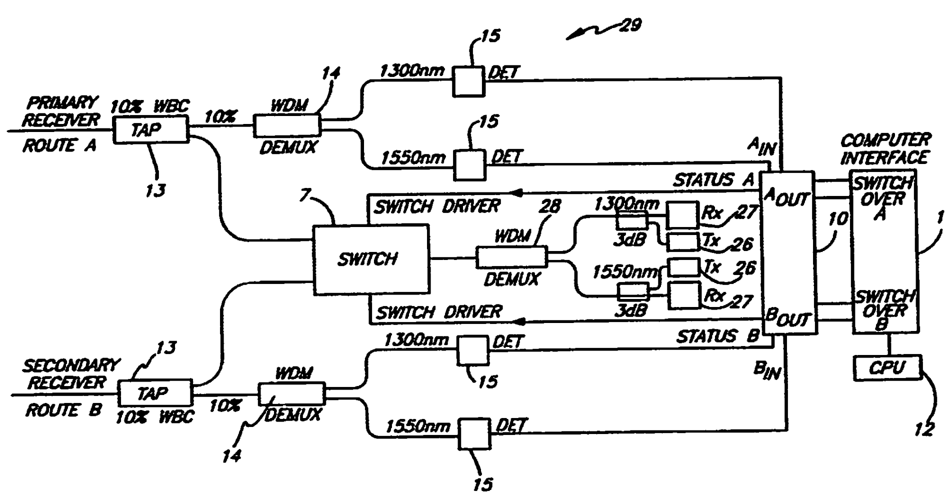

FIG. 4

47. Even in that arrangement, Routes A and B would each still include single, bidirectional fibers for transmission and reception.

Corke and Ade's Amplitude Modulation

48. Claim 14 of the '898 patent requires "an energy level detector configured to measure an energy level of the second optical signal, the energy level detector including a threshold indicating a drop in amplitude of the second optical signal." I understand Petitioners contend that the "threshold value of the minimum signal intensity acceptable" in Corke corresponds to the claimed "threshold indicating a drop in amplitude of the second optical signal." Petition, 37-38; Institution Decision, 31.

49. Corke's threshold is compared to an "average intensity." Corke explains that, "[t]he detector is selected to detect the average intensity of the signal at the selected wave length for comparison with a threshold value of the minimum signal intensity acceptable." Corke, 2:47-49. A POSITA would understand that the threshold for the "minimum signal intensity acceptable" refers to a minimum average intensity threshold.

50. I disagree that Corke's average intensity threshold satisfies the requirement for a threshold "indicating a drop in amplitude." Determining whether an "average intensity" in Corke is less than a threshold does not suggest a threshold indicating a "drop in amplitude."

51. In systems that employ amplitude modulation, the amplitude of the optical signals drops and rises based on the information to be transmitted. Consistent with that understanding, Petitioners and Dr. Blumenthal acknowledge that, "[w]ith amplitude-shift keying (ASK), the amplitude or intensity of a carrier signal is changed between a low and high state to communicate a zero or a one." Pet., 22; *see also* Ex. 1003, ¶ 64.

52. Ade relies on amplitude modulation (*see* Ade, 7:35-44), as recognized by Petitioners and Dr. Blumenthal. Pet., 46-47; Ex. 1003, ¶ 101. Additionally, Dr. Blumenthal admits that because Corke "focuses on the disclosure of an optical power detection arrangement, Corke does not explain the operation of each and every component of a fiber optic network." Ex. 1003, ¶82. Thus, in any combination of Corke and Ade, a POSITA would understand that Ade's transmitter/receiver is operating in Corke's system using amplitude modulation.

53. Petitioners contend that Corke does not explicitly mention a modulation scheme. Pet., 46. However, it is my opinion that Corke's system employs a form of amplitude modulation. Phase modulation systems require more components and more complex components, and thus are more costly. Corke is mainly considering applications such as cable TV ("CATV," col. 10, line 48), for which costs must be minimized. Indeed, Corke is greatly concerned with reducing cost, as discussed at col. 9, line 18, and col. 6, line 63. Thus, my opinion is that

Corke was contemplating an amplitude modulation system. I understand that Dr. Blumenthal admitted in another case's deposition that Corke "seems to be direct detection," which is an intensity modulation system. I agree.

54. Because the purpose of Corke's intensity threshold is to determine a fault, it would be meaningless for the threshold to detect a "drop in amplitude" of an amplitude-modulated optical signal, such as found in Ade. Under normal operating conditions of an amplitude-modulation scheme, a signal drops in amplitude regularly, to a low state, to communicate the data encoded in the signal to the receiver (not to an energy level detector). Corke's detector detects "average intensity," provides a threshold to determine if it falls below the "minimum signal intensity acceptable," and does not set any threshold to detect a "drop in amplitude."

55. Corke's operation is consistent with Petitioners' comment that "Corke does not detail the modulation schemes used," and Dr. Blumenthal's comment that Corke "generically discloses that data may be 'modulated.'" Pet., 46; Ex. 1003, ¶ 99. The use of an "average intensity" threshold in Corke allows Corke to be used in systems that employ amplitude modulation. A POSITA could set the length of time of the averaging process to be long enough to rule out variation in intensity due to normal operation.

56. Petitioners offer no reason why a POSITA would have modified Corke's average intensity monitoring to instead detect a "drop in amplitude." Moreover, removing Corke's feature relating to "average intensity," and replacing it with a threshold based on a drop in amplitude, would not have been implemented by a POSITA because this change would have eliminated Corke's monitoring ability in a system that uses amplitude modulation.

I declare under penalty of perjury under the laws of the United States that the foregoing is true and correct.

Executed this 11th day of July, 2018 in Newark, Delaware.

Keith W. Goossen, Ph.D.